From: Michael Reimer
To: Snyder, Amy
Subject: [External_Sender] introduction for review panel
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Ms. Amy Snyder, Senior Project Manager
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Division of Decommission, Uranium Recovery, and Waste Programs (DUWP)
Office of Nuclear Materials Safety and Safeguards (NMSS)
U.S. Nuclear Regulatory Commission (NRC)
Washington, D.C. 20555

Dear Ms. Snyder

Thank you for your note of June 21, 2017 addressing my concern about the request of the Army seeking exemption from requesting a license modification for making changes of small issues. I do not believe NRC should abrogate their responsibility to review what is considered a small issue without extensive definition beforehand.

I reiterate my willingness for standby on June 27, 2017 for the initial review panel meeting of my 2.206 petition request should there be any specific questions. I provide here a brief introductory synopsis to my previous submissions and trust that you will share this with the review panel before they begin their deliberations.

A new issue has arisen given that the U.S. Army has made a change to the location of the sample collection site for Pohakuloa in Hawaii. It has a basis from the previous NRC review staff commentary justifying approval of the ERMP:

The NRC staff reviewed the figures in each ERMP showing the topography of the base, the RCAs, direction of surface water runoff, and proposed sampling location(s). The NRC staff found the sampling locations to be downgradient from the various RCAs and therefore adequate for tracking and trending purposes to discern if there is any significant transport of DU from the RCAs through the actions of surface water runoff. The proposed methods of sample collection are reasonable and the frequency of collection is not inconsistent with frequencies for environmental monitoring established in NUREG-1301, “Off-site Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors.” The NRC considers it most likely that only sediment sampling (as opposed to soil sampling) will be needed because it is unlikely that significant soil transport will occur. Regardless, the NRC staff acknowledge the commitment made to sample any significant soil depositions discovered. The methods for sample analysis are commonly utilized methods and the action levels are consistent with those imposed by the NRC in license SUC-1593, LC 17.

This commentary refers to NUREG-1301 as supportive of its justification. Relocation of the sample site tends to negate the applicability of NUREG 1301. Now, the location is on longer off-site. Further, NUREG-1301 does not address depleted uranium, and it directs attention primarily to shoreline sediments.

PTA does not fit into the environments described in NUREG-1301. The sampling site is not on an actively flowing stream, it is not in an estuary, nor does it provide a shoreline for sampling. While the NRC review staff commentary found the sampling location adequate “if there is any significant transport of DU from the RCAs through the actions of surface water runoff,” that does not describe conditions at

PTA. Using the Army description and NRC's recognition for PTA, the proposed and accepted sample site located on an intermittent stream, perhaps best identified as a dry wash, will never receive runoff from the RCAs from average precipitation events. It is easy to test but no such empirical evidence is presented or proposed.

These issues with NUREG-1301 fairly well negate the NRC's justification of sediment sampling supporting the Army's selection of that method to determine if DU is migrating from the RCAs. Airborne transport is the most likely vector for movement of DU away from the RCAs and even PTA itself, and to have the greatest impact on the health and safety of those exposed, including the general public, the civilian employees of PTA and the soldiers. I know this is a contentious issue for the Army and the NRC is willing to rule in the light most favorable to the Army's request. Despite arguments to the contrary, due to conditions at the RCAs at PTA, airborne release of DU oxides is highly probable, perhaps more so than at other military installations included in the one-size fits all ERMP. This issue merits review by the 2.206 petition review panel.

I am sure the review panel will recognize the difference in the general approach in the ERMP philosophy that I have presented from that which has been approved. If the primary reason for monitoring is to determine whether or not DU is moving in some fashion from the RCAs, then the ERMP should address that issue first. The information is imperative for any analysis of health risk. The Army has presented a program that is well designed to not find DU migrating away from the RCAs. The counter argument is based on trying to find DU with the most probable transport mechanism. This is analogous to testing a hypothesis. If airborne transport is considered the null hypothesis, it must be properly tested to prove or disprove the alternative, or at least give it credibility.

If no DU is found by the single sediment site collection and methodology, the proposed conclusion that likely would be suggested is that there is no transport of DU from the RCAs. That is not a given until the alternative is tested. I recognize there is tremendous resistance to collecting and monitoring air samples and that is not an argument in my petition but is an alternative. Any claim that previous air monitoring by a private contractor showed that there is no DU is a false claim as there was no analysis for DU. As I understand the contract reports, it was only total uranium that was reported in the analysis.

Although I feel it would be incumbent of the review panel to recognize the special environmental circumstances regarding Hawaii in general and PTA in particular and to require proper air sample collection and analysis, my primary issue is that the sediment sampling as proposed and accepted is improper. Effort should be made to find evidence of DU transport, not to avoid it through improper monitoring plan design.

The Army claims that because U in DU is a very heavy element that it cannot move far in the air, conveniently ignoring movement by aerosolization. But that same argument then can be used for DU movement by water. It is so heavy that it does not move far by water, either. Therefore, it is highly improbable that sediment samples miles away from the RCAs, the collection site fed by perhaps scores of square miles of intermittent gullies and washes not associated with the RCAs, are highly unlikely to reveal by alpha spectrometry analysis any transported DU. The old standard applies: You can't have it both ways.

I agree with the Army description that there is very little precipitation at PTA (Annex 17, section 1.5 at ML17158B356), averaging yearly around 350 mm to 550 mm at various NOAA registered sites at PTA, and what does occur almost instantly filters through the porous soil and lava and that there are only intermittent streams present. I also note that there are lava flows, both historic and pre-historic between the RCAs and the proposed sampling site that can serve as barriers to the directional flow the NRC acknowledges is down gradient between the RCAs and the sample site (including the revised site). Those facts make deposition of sediment from the RCAs very unlikely at the sampling site. Sediment can represent a historical record of activity at PTA and a core sample would be more appropriate with analysis of materials from different sections. Core sampling should be considered if the sediment deposit at the suggested sampling site is conducive to such sampling.

If DU is transported by water, it is most likely to be in particulate form. When it and other material in

suspension are deposited in a sedimentary process, the sediment is going to be very inhomogeneous with regard to DU distribution within it. It is in contrast with natural uranium that is more likely distributed evenly within a rock, mineral matrix. That is why multiple samples should be collected and analyzed separately and not combined with an aliquot then taken for analysis. The "dilution factor" from consolidation poses a greater chance of missing the DU in analysis than sampling and analyzing each sample separately.

I have previously provided information why the sediment monitoring program (and the references posted) is improperly configured. Those primary arguments, among others, are:

1) Improper site selection and inadequate number of samples collected (this remains valid even though the site seems to have been relocated to within PTA boundaries);

2) Improper and incomplete descriptions of collection techniques;

3) Incomplete description of laboratory preparation methods for alpha spectrometry;

4) Too many opportunities for sample dilution;

5) Inadequate description of technique of alpha spectrometry;

6) Inadequate analyses for isotopes to identify DU (U-236 and Mo, the alloy material, and transuranics would be of paramount interest);

7) Inadequate definition of activity ratios to define DU presence*;*

8) Transparency of results.

Some suggested modifications that I had presented, corresponding to the numbers above, include:

1) *Select multiple sites for sampling adjacent to each of the 4 RCA boundaries. Every sample site should be in a water way that has had observed intermittent water flow sufficient to carry a sediment load that is deposited at the sample collection site. Further, there is no indication that the samplers will have had specific training in the simple and common aspects of sampling. Can they distinguish the difference between a sediment sample and a soil sample or a slump deposit?*

2) *Treat each collection separately; do not consolidate samples. The specific sample preparation methods in the field should be presented or referenced including the determination of sample size. The use of blanks, duplicates, references and/or calibration standards must be addressed. Organics and water should not be discarded but packaged and sent to the laboratory for separate anaylsis.*

3) *Chemicals used in preparation, exchange resins, internal standards, concentration methods for uranium, preparation of sample on planchet (electrodeposition or precipitation), counting times, reference standards, etc. must be identified. The efficiency of any preparation technique must be given.*

4) *Failure to identify the specific pathway from the RCA to the sample collection site is an egregious oversight. It is unknown how much sediment may be carried by intermittent waterways not traversing the RCAs to the sample collection site. Further, the method of combining multiple collections and using a crude blending method to separate a sample is specious and may only contribute to dilution, placing detection of target isotopes below minimum detection levels.*

5) *What is the sensitivity and what energies will be used for isotope determination? Can other U isotopes be detected (U-236) and transuranics (Pu, Np, Am)? These are important for conclusive DU presence.*

6) *The samples should be analyzed also by an ICP technique that can identify other isotopes including U-236, and isotopes off Pu, Np and Am. Such would give a specific indication of reprocessed fuel rods.*

7) G*iven the probable dilution factors of sediment sourcing and mixing multiple collected samples, any ratio of U238/234 greater than one should be considered indicative of DU. This was seen in a contractor report (Cabrerra), where soil samples often showed uranium 238/234 increased activity ratios.*

8) *The results should be released to the public in a timely manner, such as within 30 days, for review and comment.*

The Army addresses an element of erosion continued into the revised ERMP, section 2.3 (ML17158B356) and I do not disagree with its inclusion. It is an important contribution if actually performed based on common definitions and inherent conditions. It states:

If an area of soil greater than 25 square meters (m^2) eroded from an RCA is discovered during routine operations and maintenance activities, the U.S. Army will sample that deposit semiannually with one sample taken per 25 m^2 unless the soil erosion is located in a UXO area. The collection of ERM samples in UXO areas generally will not occur. Exceptions will occur only with documented consultation… The Installation Commander will then decide to allow the collection.

It uses a characteristic of erosion over 25 square meters as a trigger for sampling. Certainly, erosion provides source material for sedimentation. The U.S. Department of Agriculture definition of erosion involves the breakdown, detachment, transport, and redistribution of soil particles by forces of water, wind, or gravity. The geologic definition includes rocks as source material and transport processes including ice, wind, and water and when deposited is considered sediments. Mass wasting such as landslides or slumping ground is categorized differently.

That being the case, erosion will occur every time the wind blows greater than 10 meters per second (22 mph) and often at less speeds at barren or nearly barren areas, such as PTA. The wind-driven particles (the process is known as saltation or creep) then impact other particles often releasing dust (aerosol-sized) particles that can be carried great distances by the turbulent wind. (Ref 1.) As referenced in an earlier comment sent for panel review, dust generated by winds on the surface from Asia is commonly transported to Hawaii and the west coast of the U.S. just as Saharan Desert dust is transported to the Caribbean. Airborne transport is minimalized by the Army but that is in direct conflict with empirical observations and generation theory (i.e., Colonie, New York).

(Ref. 1)

Grini, A. and Zender, C.S., 2004, Roles of saltation, sand blasting, and wind speed variability on mineral dust aerosol size distribution during the Puerto Rican Dust Experiment (PRIDE), Jour. Geophy. Res. Atmospheres, v. 109, D7.
http://onlinelibrary.wiley.com/doi/10.1029/2003JD004233/full

Further, erosion by mechanical means is also created every time there is an explosion at PTA. High Explosives are not the issue here. Any size artillery shell can contain high explosives. Even smaller shells can contain high explosives capable of producing a shock wave (for example, TNT vs. black powder). However, even black powder is capable of producing blast pressure fronts capable of generating and removing soil and rock particulate materials.

Perhaps the choice of definition is irrelevant. View the satellite photo of PTA and the RCAs and note the numerous craters formed by explosives of unknown grade. Many of those have “eroded” the landscape by more than 25 square meters (merely the size of a gracious living room), and thus additional sampling is required by the Army’s own standards. All explosions in the RCA must be considered for implementing soil sampling and preferably, air sampling.

Explosions, whether by high or low explosives, are a very robust form of mechanical soil and rock erosion. Enforcement of sampling is required.

If the review panel is bound and determined to stay the course with an inadequate ERMP sampling approach for PTA, then at least, I implore the review panel to modify that collection and analytical plan so that there is at least a minimal chance to determine if DU is being transported away from the RCAs. I am pleased to be able to offer, at this time, my experience and training in these critical areas that may have been unavailable to the ERMP review staff [(2)] and to assist in making the ERMP relevant for its intended purpose and to have it apply with reasoned intent for public health and safety. As I have identified these very logical and common sense issues, I do not feel I have the burden of proof to prove them with self-gathered data. In fact, that would be impossible as I have not been offered access to PTA nor funding from the U.S. Army to have empirical evidence gathered. Reliance upon the combined technical expertise of the petition review panel is critical for the implementation of corrective actions. There are realistic, practical, and low-cost resolutions and they should be implemented.

I have done my best as an interested person in these issues in filing *pro se* the 2.206 petition for leave to intervene. I have tried to provide sufficient factual information including peer reviewed references to justify my concerns and disputes, including sampling of erosional sites by all mechanisms within the RCA borders. The recent proposed modification to the license (ML17158B356) newly focuses on this action where non-compliance rebuts the mission of NRC regarding assurance of public health and safety.

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(2) I offer this comment with respect, not attitude, and in light of the review staff comment in its review supporting the ERMP (as produced on page 1 of this letter). It states “The NRC considers it most likely that only sediment sampling (as opposed to soil sampling) will be needed because it is unlikely that significant soil transport will occur.” I disagree. Sediment in a natural environment is frequently and mostly composed of soil. Definitions from the USDA and other scientific agencies can be found on-line.

I am unconvinced that any sediment at the proposed sampling site has or will come from the RCAs and no evidence is presented in the ERMP to indicate that it has or will. There is no information on that particular depositional environment to provide certainty that the sediment has only originated from the RCAs and has not been carried further down the intermittent stream. Simply drawing blue arrows indicating a downhill direction is woefully inadequate to provide confidence the sediment from the RCAs is delivered to the sample location. There are no empirical observations, data, or calculated information showing the connection between the site of origin and the sampling end-site. I conclude with the old maxim, “If anything is worth doing it is worth doing right.”

Respectfully,

/s/

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